

Apparatus for thawing frozen biological fluids utilizing heating plates and oscillatory motion to enhance heat transfer by mixing

Abstract:

An improved dry heat method and apparatus for thawing frozen biological fluids utilizing electrically heated plates and oscillatory motion to enhance heat transfer by mixing as the fluid thaws. Bags of frozen fluid to be thawed are lightly squeezed between two heating plates, one of which is gently oscillated to facilitate mixing of the thawing fluid, increasing heat transfer and reducing time required for thawing. Direct contact of the heating plates against the bag surfaces increases heat transfer by eliminating insulative effects of another bag wall and a water boundary layer, compared to water bath units. Flat (or curved to conform to bag) heat pipes are preferred as heating plates compared to plain aluminum sheet. Flat heat pipes have the property of an isothermal heating surface, thus maximizing heat transfer to the coldest areas, preventing hot spots, and simplifying heating plate temperature control.